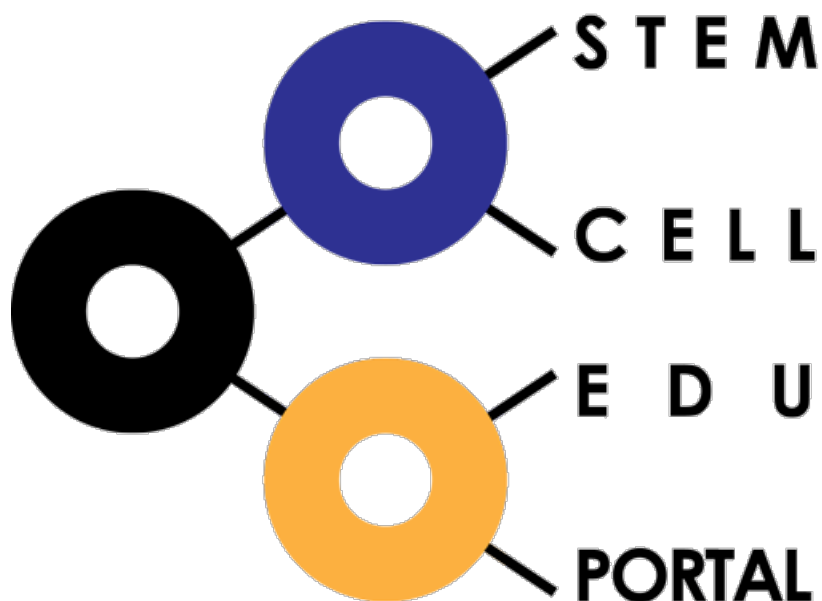


## CIRM Hosted Materials - Teachers



### CIRM-hosted stem cell education materials

The following materials have been submitted by teachers, CIRM staff, and other individuals and have been reviewed by CIRM for use in California high school classrooms. CIRM also believes these materials are appropriate for use in other states, but teachers from other states should make their own determinations based on their individual state standards.

Please help us make this a growing list! Post your own materials by following our submission guidelines. We welcome remixes of the CIRM-developed materials.

For each available download, the following information is provided when available: Title (or subject of focus), synopsis, name of individual/group that created the material, submitter's name, grade level/class suitability, applicable standards (CA or National), CIRM-review date, and download or link instructions.

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- Submitted projects and activities
- Supplementary classroom media and readings

### Recommended materials

#### Stem Cell School

The Genetics Policy Institute, the Canadian Stem Cell Network, and Radiant 3D Animation Studio bring you Stem Cell School, an educational website designed for high school and undergraduate level life-science educators. The unique educational content found on this site was developed collaboratively with award-winning high school educators, international stem cell organizations, and professional medical animators--creating dynamic and engaging educational resources that teach pertinent cellular biology topics through the lens of stem cells and cellular reprogramming.

#### KQED QUEST Stem Cell Stories

- **Stem Cell Gold Rush - video**

California's landmark *stem cell* research program made headlines nationally, but what is the latest story behind the science?

- **Stem Cell Gold Rush – Educator Guide pdf**

Educational resource to use with Stem Cell Gold Rush video

- **Stem Cells and Horses - audio**

At UC Davis Veterinary Hospital, competitive performance horses receive *stem cell* treatments that are still off limits to humans.

- **New Life for Embryonic Stem Cell Research - audio**

Soon after Barack Obama is sworn in as President next week, he is expected to reverse the ban on federal funding for embryonic *stem cell* research.

- **Stem Cells on the QUEST blog** (click on the blog refinement link)

We have numerous blog posts from our reporters and local scientists about stem cells that would make excellent supplementary reading assignments

### **Northwest Association for Biomedical Research (NWABR) Stem Cell Curriculum**

NWABR (<https://www.nwabr.org/stem-cell-curriculum-request>) curriculum and resources explore the scientific and ethical issues involved in stem cell research. Students begin by studying planaria as a model organism using a lab protocol incorporated in the CIRM-developed Unit 2: Adult Stem Cells, Homeostasis, and Regenerative Medicine. Next, students identify stages in the development of human embryos and compare the types and potencies of stem cells. They learn about a variety of techniques for obtaining stem cells and the scientific and ethical implications of those techniques. While exploring the ethics of stem cell research, students develop an awareness of the many shades of gray among the viewpoints of stakeholders in the debate. They become familiar with current U.S. stem cell research policies and regulations, issues regarding private and public funding, and how stem cells may be used to treat diseases and advance scientific knowledge.

### **BioBridge curricula and lab protocols**

The BioBridge website (<http://www.biobridge.us/>) lets world-class scientists, leading technology companies, high school students and science educators interface to develop innovative laboratory activities based on current research. Opportunities include supporting BioBridge staff at training sessions, supporting teachers in the classroom. Experienced Science Leaders can also offer one-on-one lab consultations and reviews.

### **Do No Harm: Integrated Curriculum Unit on Bioethics by ConnectEd**

ConnectEd California created a module exploring the government's role in medical decisions that affect people's lives, focusing on stem cell research (Subunit 1) and other areas in which federal or state governments have influenced biomedical research and healthcare practices. Students learn about how the government makes policy related to, supports, and regulates the healthcare industry and about how these activities impact the lives of ordinary citizens. To explore and download this unit, visit ConnectEd California. Under Integrated Biomedical and Health Science Curriculum, select Bioethics and download either the Unit Overview or the Full Unit on the drop-down menu.

### **Stem Cell Resources by the Biology Teachers Association of New Jersey**

Stem Cell Resources ([www.stemcellresources.org](http://www.stemcellresources.org)) is a clearinghouse with a global perspective. It contains stem cell biology, ethics, and policy information and teaching resources. Stem Cell Resources provides timely, reliable, high-quality and scientifically credible stem cell teaching materials for the educational community worldwide.

### **The Biology Corner**

The Biology Corner website provides more than 35 in-class and virtual biology student labs and activities on cell parts, cell reproduction, and cell processes. Most seem appropriate for beginning biology students. You can access:

- Lesson plans (<http://www.biologycorner.com/lesson-plans/cells/>)
- Worksheets on DNA processes, found in DNA section (<http://www.biologycorner.com/worksheets.html>)
- The Genetic Science Ethics worksheet, which promotes discussion with your students about new genetic technologies ([http://www.biologycorner.com/worksheets/genetic\\_science\\_ethics.html](http://www.biologycorner.com/worksheets/genetic_science_ethics.html))

## Submitted PowerPoint presentations

**Asymmetric Division in Muscle Stem Cells**, Christian Elabd, Ph.D. and Joey Pham, B.A., UC Berkeley Bioengineering department, suitable for 9-12th grade, reviewed 5/10/10, click below to download presentation.

While most cells in the body divide strictly symmetrically, stem cells have the ability to divide asymmetrically as well. In the context of muscle regeneration, asymmetric division may allow for muscle regeneration without exhausting the pool of satellite cells (or muscle stem cells). Understanding the mechanism of asymmetric division is essential to advancing the control of stem cell self-renewal versus differentiation. Such control is necessary for the use of stem cells in regenerative medicine. Click here for a slideshow on how asymmetric cell division is a defining property of muscle stem cells.

**Pluripotent Stem Cells in Pharmaceutical Development**, Candice Tahimic, Ph.D., Children's Hospital Oakland Research Institute, suitable for 9-12th grade, reviewed 1/10/10, click below to download presentation.

Embryonic stem cells and induced pluripotent stem cells have the ability to proliferate indefinitely and differentiate into any type of cell in the body. Because of these characteristics, these cells can serve as models for human diseases. In this case, ES cells or patient-derived iPS cells are grown in dishes and converted into the desired cell type. The resulting cells can then be used to test for the ability of candidate drugs to treat a particular disease phenotype. Click here for a slideshow on how human ES and iPS cells can be used to develop better drugs.

## Submitted projects and activities

**Biotechnology Company Project**, Julie Reis and George Cachianes, Lincoln High School. Suitable for biotechnology or business classes. reviewed 10/21/09, click below to download.

During this year-long group project, groups of 5 or 6 students each choose a biotechnology company and compile and maintain a binder containing pertinent company information, including company focus, product pipeline, and employment opportunities. Students take on dual roles of a company officer and a job applicant or investor requesting information. Students write a business letter introducing themselves to the company and requesting information, examine and critique the company website, design an original logo and a brochure, prepare an informative poster for a class presentation, explain in detail how one or two of the company's products work at a molecular or cellular level, and prepare a graph illustrating the performance of the company's stock over the course of the year. Project goals: To expose students to the variety of career opportunities in the biotechnology industry; to acquaint students with business practices, including the role of different officers in a typical corporate organizational hierarchy; to reinforce student understanding of scientific concepts learned during the year; and to motivate students to plan for a future career and take into account the education they need to work in that field.

Download materials:

- Modeling a biotechnology company - teacher guide
- Biotechnology company project student handout
- Company project assignments timeline
- Biotech company brochure rubric
- Principles of Biotechnology Poster Session
- Biotech company poster rubric

**The Stem Cell Controversy: A Role Playing WebQuest**, New Trier High School science teacher Kelly Breiner, software specialist Mary Ann Apple and librarian Deborah Lazar. Suitable for biology and biotechnology classes. Created August 2009. Reviewed 1/26/2010.

Go to the WebQuest.

## Supplementary classroom media and readings

## Animations

For each download, the following is provided: Title (or subject of focus), one-sentence synopsis, name of individual/group that created animation, submitter's name, grade level/class suitability, applicable standards (CA or National), CIRM-review date, download or link instructions.

For animations on a wide variety of stem cell topics, see the Topics Page.

**Bio-Alive: The Life Science Video Share** is a hub for favorite videos in the fields of biology, medicine and life science including but not limited to laboratory methods, techniques, experimental or operation procedures, lab actions, animations, lectures, seminars, meetings, as well as teaching and learning slideshow. Contains many animations on cell biology and stem cells, especially appropriate for supplementing unit 3. Reviewed 11/27/10.

Howard Hughes Medical Institute Stem Cell Animations on BioInteractive, from the 2006 Holiday Lectures on Potent Biology: Stem Cells, Cloning, and Regeneration. Contains many animations suitable for Units 1 and 2. Reviewed 11/27/10.

## Fair use image library

Be sure to check out CIRM's Flickr site: <http://www.flickr.com/photos/cirm>

## Submitted images

For each image, the following is provided: Name of the individual/group that created image (or appropriate credit), title (or subject of focus), caption (one-sentence explanation of image), submitter's name, CIRM-review date

## Interviews, videos, and radio

### Video interviews on CIRM site

Contains: Stem cell basics videos, Spotlights on Disease, and Seminars

### Submitted videos:

#### Stem Cells: Myths, Truths, and Possibilities

Learn what stem cells are all about in this informative video created by lab members of Deepak Srivastava, MD: Kathryn N. Ivey, PhD, Josh Arnold and Mark P. White. This video, produced by the Gladstone Institutes, was the winner of the 2009 International Society for Stem Cell Research video contest. Reviewed 1/12/10.

#### ConnectEd Curriculum Videos: Stem Cell Education Series

Learn about how stem cell science, ethics, policy, and education are intertwined with these three special pieces. ConnectEd California; video producer Carl Brown. Reviewed 1/26/2010.

### Radio interviews

CIRM President Alan Trounson gives a stem cell research overview to the Milken Institute. Reviewed 10/21/09  
KQED Quest television show about stem cell research. Reviewed 10/21/09

## Stem Cell Science and Ethics Primers

- The National Institutes of Health Stem Cell Information
- The National Academies Stem Cell Basics
- International Society for Stem Cell Research
- Congregation for the Doctrine of the Faith: Instruction Dignitas Personae on certain bioethical questions
- The United Synagogue of Conservative Judaism: Review on Embryonic Stem Cell Research
- Coalition for the Advancement of Medical Research stem cell background

### Submitted Articles

Provided for each article: Title of article, synopsis (incl. access status), difficulty level EASY/MID/CHALLENGING, author's name, publication date, submitter's name, review date.

#### All Things Stem Cell (Active blog)

"All Things Stem Cell" is a blog dedicated to investigating and discussing stem cells in a multifaceted manner; this blog strives to go beyond definitions of different discovered stem cell types to explore their history, harvesting methods, applications and uses in regenerative medicine, potential problems, and recent news. Difficulty level: AP Biology; MID/CHALLENGING. Author: Teisha Rowland. Publication date: 2009. Reviewed 11/14/2010. Teisha also has a biology column, called "Biology Bytes," with the Santa Barbara Independent

#### The Niche: A Stem Cell Blog (Archive)

The Niche is a blog hosted by Nature Reports Stem Cells to provide an informal forum for debate and commentary on stem cell research and its wider implications for ethics, policy, business, and medicine. Difficulty level: MID/CHALLENGING. Author: Monya Baker. Publication date: June 2007-Oct 2009. Reviewed 1/26/2010.

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**Source URL:** <http://www.cirm.ca.gov/our-progress/cirm-hosted-materials-teachers>